**IntBag.java**

**package** NumericalCollectionClasses;

**public** **class** IntBag {

// Attributes

// Array to hold integers (the "bag").

**private** **int**[] sack;

// Maximum size of the bag (capacity).

**private** **int** size;

// Current number of elements in the bag.

**private** **int** counter;

// Methods

// Constructor: Initializes the IntBag with a specified size.

**public** IntBag(**int** size) {

// Ensure the size is at least 2 (precondition check).

**if** (size < 2) {

// Throw an exception if the size is too small.

**throw** **new** IllegalArgumentException("Bob, wake up, your array size is not compliant with the precondition of this method.");

}

**this**.size = size; // Set the maximum size of the bag.

sack = **new** **int**[size]; // Initialize the array to hold integers.

counter = 0; // Initially, the bag is empty.

}

// Adds an integer to the bag.

**public** **void** add(**int** item) {

// Check if the bag is full before adding a new element.

**if** (counter == **this**.size) {

**throw** **new** IllegalArgumentException("The array index is out of bounds. Unable to insert new data in the collection class.");

}

// Add the item to the bag and increment the counter.

sack[counter++] = item;

// Print the result to the console.

//System.out.println("The number " + item + " is being added to " + sack);

}

// Counts how many times a specific value appears in the bag.

**public** **int** countInstances(**int** target) {

**int** occurrences = 0; // To track the number of matches.

**int** scanIndex = 0; // To traverse the array.

// Loop through the bag up to the current number of elements.

**while** (scanIndex < counter) {

// Increment the count if the current element matches the target.

**if** (sack[scanIndex] == target) {

occurrences++;

}

scanIndex++; // Move to the next element.

}

// Return the total number of matches.

**return** occurrences;

}

// Deletes the first instance of a specific value from the bag.

**public** **boolean** delete(**int** target) {

**int** scanIndex = 0; // To traverse the array.

// If the bag is empty, nothing can be deleted.

**if** (counter == 0) {

**return** **false**;

}

// Loop through the bag up to the current number of elements.

**while** (scanIndex < counter) {

// If the target value is found.

**if** (sack[scanIndex] == target) {

// Replace it with the last element in the bag and decrement the counter.

sack[scanIndex] = sack[--counter];

**return** **true**; // Indicate that the deletion was successful.

}

scanIndex++; // Move to the next element.

}

// If the target value was not found, return false.

**return** **false**;

}

// Method to compare the number of items in this bag with another bag.

**public** String compareBagSize(IntBag otherBag) {

**int** difference = Math.*abs*(**this**.counter - otherBag.counter); // Calculate size difference

**if** (**this**.counter > otherBag.counter) {

**return** "Bag#1 has more items with " + **this**.counter + " items. "

+ "It has " + difference + " more items than Bag#2.";

} **else** **if** (**this**.counter < otherBag.counter) {

**return** "Bag#2 has more items with " + otherBag.counter + " items. "

+ "It has " + difference + " more items than Bag#1.";

} **else** {

**return** "Both bags have the same number of items: " + **this**.counter;

}

}

}

**package** Runnable;

**import** NumericalCollectionClasses.IntBag;

**public** **class** collectionClassINAction {

**public** **static** **void** main(String[] args) {

// Print a greeting message to indicate program execution.

System.***out***.println("Hello human, we are a collection class in action");

// Create two IntBag objects with different sizes.

IntBag bag1 = **new** IntBag(7); // First bag with a capacity of 7.

IntBag bag2 = **new** IntBag(10); // Second bag with a capacity of 10.

// Add elements to bag1.

bag1.add(1);

bag1.add(2);

bag1.add(3);

bag1.add(4);

bag1.add(5);

bag1.add(2);

bag1.add(2);

// Add elements to bag2.

bag2.add(6);

bag2.add(7);

bag2.add(8);

bag2.add(9);

bag2.add(10);

// Define a target value to search for in bag1.

**int** target = 2;

// Count the number of times the target value appears in bag1.

**int** instances = bag1.countInstances(target);

// Print the result to the console.

System.***out***.println("The number of instances of target data " + target + " is: " + instances + " in the bag");

// Use the new method from IntBag to compare the two bags.

System.***out***.println(bag1.compareBagSize(bag2));

}

}

